

**REMARKS**

Claims 1 to 26 are all the claims pending in the application, prior to the present amendment.

Applicants have amended independent claim 1 to incorporate the substance of claims 2, 11 and 15, which have been canceled. Applicants have amended claim 18 in a similar manner and have canceled claims 19 and 20. In addition, claims 14, 16, 17, 23 and 24 have been canceled. Applicants have amended claims 4-10, 12, 13, 21, 22, 25 and 26 so that they do not contain improper multiple dependencies.

The Examiner requires a new title. The Examiner suggests that after the word "Medium," the following phrase should be inserted: "Including Both Oxide and Non-oxide Perpendicular Magnetic Layers." While applicants believe the present title is sufficient, applicants have amended the title as suggested by the Examiner.

The Examiner requires applicants to file in the provisional application 60/462,298, both an English-language translation and a statement that the translation of the provisional application is accurate.

Applicants point out, however, that applicants filed such a verified translation in the provisional application on April 13, 2004. Applicants attach a copy of a filing receipt that has been stamped by the U.S. Patent and Trademark Office with a date stamp of April 13, 2004 showing this filing. Accordingly, applicants request the Examiner to withdraw this requirement.

Claims 1-26 have been rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent 7,132,176 to Iwasaki et al.

Applicants submit that the present claims as amended above are not obvious from the claims of Iwasaki et al and, accordingly, request withdrawal of this rejection.

Claim 1 of the present application as amended above is directed to a magnetic recording medium comprising a magnetic substrate and at least three layers formed on the magnetic substrate and comprised of an orientation-controlling layer for controlling orientation of a layer formed directly thereon, a perpendicular magnetic layer, and a protective layer. The perpendicular magnetic layer comprises two or more magnetic layers. At least one of the magnetic layers is a lower layer having Co as a main component and containing Pt and an oxide. At least one of the magnetic layers is an upper layer having Co as a main component and containing Cr and no oxide. The lower magnetic layer containing the oxide comprises magnetic crystal grains dispersed in the lower layer and the crystal grains vertically penetrate the lower layer in columnar forms. The upper layer comprises magnetic crystal grains that are formed and epitaxially grown on the magnetic crystal grains of the lower layer on an upper surface of the lower.

Claim 18 is directed to a method for producing a magnetic recording medium and has been amended in a manner similar to claim 1.

None of the claims of the '176 patent recite an orientation-controlling layer. The Examiner does not provide any reason why he considers that it would have been obvious to employ an orientation-controlling layer in the claims of the '176 patent. Further, none of the claims of the '176 patent recite a lower magnetic layer containing an oxide and comprised of magnetic crystal grains dispersed in the lower layer and the crystal grains vertically penetrate the

lower layer in columnar forms. In addition, none of the claims of the '176 recite an upper layer that comprises magnetic crystal grains that are formed and epitaxially grown on the magnetic crystal grains of the lower layer on an upper surface of the lower.

In view of the above, applicants submit that the present claims are not obvious from the claims of the Iwasaki et al patent and, accordingly, request withdrawal of this rejection.

Claims 1-26 have been objected to because of the preamble recitation. The Examiner states that the preamble recitation "A magnetic recording medium provided on a nonmagnetic substrate" in claims 1 and 11 contains wording that is confusing to one of ordinary skill in the art.

The Examiner suggests rewording the preamble. Although applicants do not agree with the Examiner that the present wording of the preamble is confusing, applicants have amended the claims as proposed by the Examiner in order to reduce the issues.

Claims 16 and 17 have been objected to under 37 C.F.R. 1.75(c) as being improper dependent claims because they fail to further limit the subject matter of a previous claim.

In response, applicants have canceled claims 16 and 17.

Claims 1-26 have been rejected under 35 U.S.C. § 102(a), (b) and/or (e) as anticipated by U.S. Patent Application No. 2001/0051287 to Kikitsu et al.

In addition, claims 1-26 have been rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent 6,830,824 to Kikitsu et al.

The Examiner points out that the U.S. '824 patent is the patent that issued from the published application of U.S. '287. The Examiner states that in his detailed statement of the rejection, he refers by column and line number to passages from U.S. Patent 6,830,824.

Applicants submit that Kikitsu et al '824 do not disclose a magnetic recording medium that satisfies the recitations of claims 1 and 18.

As set forth above, the present invention as set forth in claim 1 as amended above is directed to a magnetic recording medium comprising a nonmagnetic substrate, and at least three layers formed on the magnetic substrate and comprised of an orientation-controlling layer for controlling orientation of a layer formed directly thereon, a perpendicular magnetic layer having an easily magnetizing axis oriented mainly perpendicularly relative to the nonmagnetic substrate, and a protective layer. The perpendicular magnetic layer comprising two or more magnetic layers, at least one of which magnetic layers is a lower layer having Co as a main component, containing Pt and an oxide and at least another of the magnetic layers is an upper layer having Co as a main component and containing Cr and no oxide. The lower magnetic layer containing the oxide comprises magnetic crystal grains dispersed in the lower layer and the crystal grains vertically penetrate the lower layer in columnar forms. The upper layer comprises magnetic crystal grains that are formed and epitaxially grown on the magnetic particles on an upper surface of the lower layer.

Kikitsu et al '824 disclose many different embodiments of a magnetic recording medium. In one embodiment, the magnetic recording medium comprises a substrate, a base layer formed on the substrate and comprising a magnetic material, a switching layer formed on the base layer

and comprising a nonmagnetic material and a recording layer formed on the switching layer and having a structure comprising magnetic particles and a nonmagnetic wall buried between the magnetic particles. In various embodiments of Kikitsu et al '824, a functional layer, made of a magnetic material, is provided immediately below and in contact with a recording layer.

The recording layer of Kikitsu et al '824 is a layer that can contain an oxide and can contain columnar, magnetic particles. See Examples 1, 2, 6 and 8 of Kikitsu et al '824. In Kikitsu et al '824, however, the recording layer containing an oxide generally is an upper layer, and generally is present on a lower magnetic layer that contains no oxide. This stacking structure in Kikitsu et al '824 is the opposite of the present invention where the lower layer contains oxide and columnar grains that vertically penetrate the lower layer and the upper layer contains no oxide and grains that are epitaxially grown on the magnetic grains of the lower layer.

Thus, the present invention and Kikitsu et al '824 differ in the stacking order of the magnetic layer containing oxide and the magnetic layer containing no oxide. Further, in Kikitsu et al '824, the magnetic particles of the magnetic layer containing no oxide are not epitaxially grown on the magnetic particles of the magnetic layer containing the oxide.

The Examiner has referred to Examples 13 and 14 of Kikitsu et al '824. These Examples do not suggest the present invention.

Example 13 of Kikitsu et al '824 describes a magnetic recording medium comprised of a glass substrate, a Cr underlayer, a  $\text{Co}_{77}\text{Cr}_{20}\text{Ta}_3$  functional layer and a  $(\text{Co}_{80}\text{Pt}_{20})\text{-(SiO}_2\text{)}$  recording layer, stacked in this order. Thus, Kikitsu et al '824 disclose in Example 13 a lower magnetic layer that contains no oxide and an upper layer that contains an oxide. There is no disclosure in

Example 13 of Kikitsu et al '824 that the lower layer of Example 13 contains columnar magnetic grains and no disclosure that the upper layer contains epitaxially grown magnetic grains.

Example 14 of Kikitsu et al '824 discloses a magnetic recording medium prepared as in Example 11 having a three-layered structure comprising a  $\text{Co}_{78}\text{Cr}_{19}\text{Pt}_3$  functional layer, a  $(\text{Fe}_{55}\text{Pt}_{45})\text{Cu}_{10}$  recording layer and another  $\text{Co}_{78}\text{Cr}_{19}\text{Pt}_3$  functional layer. None of these three layers are layers that contain an oxide, and none of these three layers are layers which are disclosed as containing columnar particles. Further, the recording layer of Example 14 does not contain Co. Applicants submit that one of ordinary skill in the art would not be led to combining the teachings of Examples 13 and 14 of Kikitsu et al '824 since they relate to different embodiments, and that even if such teachings were combined, they do not teach or suggest that a non-oxide Co-, Cr-containing magnetic layer can or should be formed epitaxially on an oxide-containing Co- and Pt-containing magnetic layer that is comprised of columnar magnetic grains.

In view of the above, applicants submit that Kikitsu et al '824 do not disclose or render obvious the subject matter of the present claims and, accordingly, request withdrawal of this rejection.

Claims 5 and 25 have been rejected under 35 U.S.C. § 103(a) as obvious over Kikitsu et al '824 and further in view of U.S. Patent Application No. 2003/0134151 to Usuki et al.

Claims 5 and 25 depend from claims 1 and 18, respectively.

Applicants submit that Usuki et al do not supply the above-noted deficiencies of Kikitsu et al '824 with respect to providing a perpendicular magnetic layer comprised of an oxide-

containing lower layer that contains columnar crystal grains and a non-oxide-containing upper layer in which crystal grains are epitaxially grown on the crystal grains of the lower layer.

Usuki et al disclose a magnetic recording medium that contains a primer layer as a lower layer on which an oxide-containing magnetic layer can be formed in a column-like structure. As disclosed in paragraph [0039] of Usuki et al, the magnetic layer comprises a cobalt-containing ferromagnetic metal alloy and a non-magnetic oxide.

The primer layer can be a Cr-containing layer or a ruthenium-containing layer. As disclosed in paragraphs [0114] and [0140] of Usuki et al, the crystal growth of the magnetic layer occurs by reflecting the crystal orientation of the Cr- or Ru-containing primer layer. Thus, Usuki et al do not disclose or suggest an oxide-containing lower layer that contains columnar magnetic crystal grains and a non-oxide containing upper layer in which magnetic crystal grains are epitaxially grown on the magnetic crystal grains of the lower layer.

In view of the above, applicants submit that claims 5 and 25 are patentable over Kikitsu et al and Usuki et al and, accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111  
Application No. 10/552,445

Attorney Docket No. Q75081

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.


Respectfully submitted,

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**23373**

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**FILING RECEIPT**  
**PLEASE DATE STAMP AND RETURN TO US - BOX 235X**

In re application of

Akira SAKAWAKI, et al.

Appln. No.: 60/462,298

Group Art Unit: not yet assigned

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For: MAGNETIC RECORDING MEDIUM, PRODUCTION PROCESS THEREOF, AND  
MAGNETIC RECORDING AND REPRODUCING APPARATUS

PAPER(S) FILED ENTITLED:

1. Submission of Verified English Language Translation, sixty-eight (68) pages of specification, four (4) pages of a translation of the drawings and translator's Declaration.

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